

## REMARKS

### A. Background

Claims 58-68 and 80-119 were pending in the application at the time of the Office Action. The Office Action rejected claims 59 and 80-119 as being indefinite. Claims 58, 60-68, and 80-83 were rejected as being anticipated by cited art. Claims 115-119 were deemed to contain allowable subject matter if amended so as to overcome the indefiniteness rejection. By this response Applicant has cancelled claim 59; amended claims 58, 60-68, 80, 83-86, 89, 90, 92-94, 97-100, 102, 103, 106, 109, 112-115, and 119; and added new claims 120-124. As such, claims 58, 60-68, and 80-124 are presented for the Examiner's consideration in light of the following remarks.

### B. Proposed Amendments

Applicant has herein amended claims 58, 60-68, 80, 83-86, 89, 90, 92-94, 97-100, 102, 103, 106, 109, 112-115, and 119 to further clarify, more clearly define, and/or broaden the claimed inventions to expedite receiving a notice of allowance. For example, independent claims 58, 80, 83, and 84 have been amended to clarify the definitions of: "input port", "output port," "input-light," and "output-light." Claims 58, 80, 83, and 84 have also been amended to recite that "each refractive index of the pixels is determined by repeating calculations until a phase difference between a forward propagation of an input field of the input-light and a reverse propagation of an output field of the output-light becomes less than a desired value at each pixel." Other amendments to the claims have also been set forth herein to clarify the inventions and to address formal issues. New claims 120-124 have also been added. The new claims and amendments to the existing claims are supported in the application at least at page 35, line 5 to

page 40, line 23; page 46, line 18 to page 52, line 17; page 54, line 12 to page 56, line 14; and page 119, line 15 to page 121, line 1.

C. Indefiniteness Rejections

Pages 2-4 of the Office Action reject claims 59 and 80-119 under 35 USC § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Specifically, the Office Action asserts that various elements lack antecedence basis and that the meaning of some claim language is unclear. In light of the cancellation of claim 59 and amendments set forth herein to claims 80, 83, 84, 86, 89, 93, 106, 109, 112, 114, and 115, Applicant respectfully submits that the indefiniteness rejection has been overcome and should be withdrawn.

D. Anticipation Rejections

Pages 5 and 6 of the Office Action reject claims 58, 60, 62, 63, 68, 80, and 82 under 35 USC § 102(b) as being anticipated by U.S. Patent No. 5,822,475 to Hirota et al. ("*Hirota*"). Pages 6 and 7 of the Office Action reject claims 58, 60-63, 68, and 80-82 under 35 USC § 102(a) as being anticipated by an article titled *Multimode Interference-Based Two-Stage 1 x 2 Light Splitter for Compact Photonic Integrated Circuits* by Masanovic et al. ("*Masanovic*"). Pages 8 and 9 of the Office Action reject claims 58, 60, 62, 63, 66-68, 80, and 82 under 35 USC § 102(e) as being anticipated by U.S. Patent No. 7,006,732 to Gunn, III et al. ("*Gunn*"). Pages 9-11 of the Office Action reject claims 58, 60, 62-65, 68, 80, 82, and 83 under 35 USC § 102(e) as being anticipated by U.S. Patent Application Publication No. 2006/0051022 to Levner et al. ("*Levner*"). Of the rejected claims, claims 58, 80, and 83 are independent claims. Applicant

respectfully traverses this rejection and submits that none of the cited references anticipate the rejected claims because none of the cited references include each and every claim limitation recited in the rejected claims.

*Hirota* discloses an optical bus having diffusers to diffuse the input signal beam and propagate the diffused signal beam. See Abstract. As shown in Figure 6, the signal beam is outputted from a laser diode 42a of one circuit board, randomly and repeatedly diffused, and then inputted into a photodiode 42b of another board. See col. 7, lines 48-67. Although *Hirota* discloses diffusion of an input signal, Applicant can find no disclosure or suggestion within *Hirota* of a spatial refractive index distribution as defined by the rejected claims.

*Masanovic* discloses a two-stage Multimode Interference (MMI) splitter that splits an input signal into two outputs. See Abstract and Figure 1. However, similar to *Hirota*, Applicant can find no disclosure or suggestion within *Masanovic* of a spatial refractive index distribution as defined by the rejected claims.

*Gunn* discloses a polarization splitting grating coupler (PSGC) that separates a received optical signal into two polarizations that are directed to two separate waveguides. See Abstract. As shown in Figure 1, the PSGC includes a cross grating 102 that has a plurality of light scattering elements 106. Although the light scattering elements are used to scatter the input signal, Applicant can find no disclosure or suggestion within *Gunn* of a spatial refractive index distribution as defined by the rejected claims.

*Levner* discloses an apparatus for detecting multiple optical wave lengths. However, Applicant can find no disclosure or suggestion within *Levner* of a spatial refractive index distribution as defined by the rejected claims.

In view of the foregoing, Applicant submits that none of the cited references anticipate the rejected claims at least because the references do not disclose or suggest all of the claim limitations. Specifically, Applicant submits that *Hirota*, *Masanovic*, *Gunn*, and *Levner* all fail to disclose or suggest a spatial refractive index distribution that “is designated by each refractive index of pixels defined by a mesh, and said each refractive index of the pixels is determined by repeating calculations until a phase difference between a forward propagation of an input field of the input-light and a reverse propagation of an output field of the output-light becomes less than a desired value at each pixel,” as recited in amended claims 58, 80, and 83. Accordingly, Applicant respectfully requests that the anticipation rejection with respect to claims 58, 80, and 83 be withdrawn.

Claims 60-68, 81, and 82 each depends from one of claims 58 and 80 and thus incorporates the limitations thereof. As such, Applicant submits that claims 60-68, 81, and 82 are distinguished over the cited art for at least the same reasons as discussed above with regard to claims 58 and 80. Accordingly, Applicant respectfully requests that the anticipation rejection with respect to claims 60-68, 81, and 82 also be withdrawn.

E. Claims 84-114

Page 3 of the Office Action states that because of the indefiniteness rejection of independent claim 84, “[n]o meaningful comparison of claim 84 to the prior art can be made at this time.” As such, the Office Action fails to reject claim 84 based on any prior art references. Apparently, the Office Action also has determined that corresponding dependent claims 85-114 can also not be compared to the prior art, as those claims are also not specifically rejected based on any prior art references.

As discussed above, Applicant has herein amended claim 84 to overcome the indefiniteness rejection. Furthermore, Applicant submits that claim 84 is distinguished over the cited references for at least the same reasons set forth herein with regards to claims 58, 80, and 83. As such, Applicant submits that claim 84 and corresponding dependent claims 85-114 are in allowable condition.

F. Allowable Subject Matter

Page 11 of the Office Action states that claim 115 (and corresponding dependent claims 116-119) would be allowable if amended to overcome the indefiniteness rejection discussed above. As discussed above, Applicant has herein amended claim 115 to overcome the indefiniteness rejection. Accordingly, Applicant submits that claims 115-119 are in condition for allowance.

Applicant submits the following comments concerning the Examiner’s statements of reasons for the indication of allowable subject matter set forth in the Office Action. In general, Applicant agrees with the Office Action that the inventions to which claims 115-119 are directed

are patentable over the cited references, but respectfully disagrees with the statement of reasons for allowance as set forth in the Office Action.

Particularly, Applicant submits that it is improper to characterize a single limitation, or subset of limitations, as constituting the basis for allowance of a claim. Rather, the patentability of a claim is properly determined with reference to the claim as a whole. Accordingly, Applicant does not concede that the reasons for allowable subject matter given by the Office Action are the only reasons that make, or would make, the claims allowable and Applicant does not make any admission or concession concerning the statements in the Office Action concerning the allowability of claims 115-119 in view of the cited references.

G. Conclusion

Applicant notes that this response does not discuss every reason why the claims of the present application are distinguished over the cited art. Most notably, applicant submits that many if not all of the dependent claims are independently distinguishable over the cited art. Applicant has merely submitted those arguments which it considers sufficient to clearly distinguish the claims over the cited art.

In view of the foregoing, applicant respectfully requests the Examiner's reconsideration and allowance of claims 58, 60-68, and 80-124 as amended and presented herein.

In the event there remains any impediment to allowance of the claims which could be clarified in a telephonic interview, the Examiner is respectfully requested to initiate such an interview with the undersigned.

Dated this 25th day of January 2008.

Respectfully submitted,

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